

COMPARISON OF COURSE COMPLETION AND ACADEMIC PERFORMANCE
IN ONLINE VS. TRADITIONAL COURSES

A Dissertation

by

THOMAS WAYNE ATCHLEY

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF EDUCATION

August 2010

Major Subject: Agricultural Leadership, Education, and Communications

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Approved by:

Co-Chairs of Committee, Gary J. Wingenbach
Cindy Akers

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ABSTRACT

Comparison of Course Completion and Academic Performance in Online vs. Traditional
Courses. (August 2010)

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Enrollment in online courses has outpaced overall university enrollment for the past several years. The growth of online courses does not appear to be slowing. The purpose of this study was to examine the origins of online education at Tarleton State University, to compare course completion and student academic performance between online and traditional courses, and to develop a predictive model for students' successful completion of online courses. Archival data from the Tarleton student records system was collected using the Structured Query Language. Descriptive statistics were used to analyze student characteristics. Chi-square analysis was used to determine if significant differences existed between students enrolled in online and traditional courses when comparing course completion and academic performance. Analysis found significant differences existed in both course completion and academic performance for students enrolled in online vs. traditional courses. Additional analysis indicated significant differences existed in course completion by course discipline. A predictive model was created using binary logistic regression and included the predictor variables age, student

classification, term course load, and cumulative GPA. The final model correctly predicted successful completion of 85.5% of all cases.

DEDICATION

I dedicate this entire degree to my wonderful wife and two perfect little boys. I had to be away from you quite a bit, and I know I missed some precious moments I cannot get back. Your support and understanding when I just needed to lock myself away and pull off another “Just-In-Time” assignment was invaluable. I love you so much and appreciate you running beside me through this marathon.

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Trying to thank everyone who helped me get to this point in my education would fill many volumes and take longer to write than this “Little Paper.” However, there are quite a few individuals I must recognize by name.

To my committee chair: I offer my most sincere thanks, and a big man-hug, to Gary Wingenbach. Through numerous revisions, and a ton of e-mails, you remained calm and supportive of my goals. I appreciate your willingness to help me become a better writer/researcher. Without your commitment to my success, I would not have completed this manuscript. I look forward to working with you as a colleague in the future.

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TABLE OF CONTENTS

	Page
ABSTRACT	iii
DEDICATION	v
ACKNOWLEDGEMENTS	vi
LIST OF TABLES	ix
LIST OF FIGURES	xi
CHAPTER	
I INTRODUCTION	1
Formula Funding	1
Literature Review	3
Purpose	6
Need for the Study	6
Objectives	7
Design	7
Population	8
Sample	8
Data Collection	9
Data Analysis	10
Definition of Terms	11
II CASE STUDY OF THE FOUNDATIONS OF ONLINE EDUCATION AT TARLETON STATE UNIVERSITY	12
Introduction	12
Purpose and Objectives	13
History	13
The ARPANET	14
The Birth of Electronic Mail	15
World Wide Web	16
Online Education at Tarleton State University	19
State of Texas Funding	24
Conclusion	26

CHAPTER	Page
III	COMPARISON OF COURSE COMPLETION AND STUDENT PERFORMANCE THROUGH ONLINE AND TRADITIONAL COURSES 28
	Introduction 28
	Formula Funding 29
	Course Completion 30
	Student Performance 31
	Course Completion by Discipline 32
	Purpose and Objectives 33
	Methodology 34
	Results 37
	Conclusions and Recommendations 40
IV	SUCCESS FACTORS: A PREDICTIVE MODEL FOR STUDENT ACADEMIC SUCCESS IN ONLINE COURSES 44
	Introduction 44
	Purpose and Objectives 48
	Methodology 49
	Results 52
	Conclusions 59
	Recommendations 61
V	SUMMARY AND CONCLUSIONS 64
	Formula Funding 64
	History of Online Education at Tarleton State University 65
	Course Completion and Academic Performance 67
	Predictive Model of Online Academic Success 68
	Research Implications and Recommendations 69
	Practical Implications and Recommendations 70
	REFERENCES 72
	VITA 81

LIST OF TABLES

TABLE		Page
2.1	Total and Online Enrollment Fall 2004 – Fall 2008	22
3.1	Contingency Table for Students' Academic Performance	38
3.2	Contingency Table for Course Completion Rates.....	39
3.3	Contingency Table for Course Completion by Course Discipline....	40
4.1	Online Student Ethnicity Comparison.....	53
4.2	Online Course Enrollments by Student Classification	54
4.3	Course Load by Student Level	55
4.4	Frequencies of GPA by Semester Fall 2004 through Spring 2009 ...	56
4.5	Summary of Linear Regression Analysis for Variables Predicting Successful Online Course Completion.....	57
4.6	Classification Table for Binary Logistic Regression Model	58
4.7	Regression Coefficients for Binary Logistic Regression Model.....	59

LIST OF FIGURES

FIGURE		Page
2.1	Online Course Offerings at TSU from Academic Year 2005 Through Academic Year 2009	20
2.2	Traditional Course Offerings at TSU from Academic Year 2005 Through Academic Year 2009	21

CHAPTER I

INTRODUCTION

According to Allen and Seaman (2008), there were roughly 3.5 million students enrolled in one or more online courses during fall 2006, representing a 10% increase over previous years. Growth in online course enrollments is clear and many researchers agree that the future of higher education is linked to online course delivery (Berger & Lyon, 2005; Harasim, 2000; Palloff & Pratt, 2003).

Anecdotal evidence and quantitative research has shown that course completion is generally lower in online courses compared to the traditionally delivered equivalent course (Brady, 2001; Carr, 2000; Simpson, 2003). This assertion is challenged by Roach (2002) who found that some institutions report equivalent or higher course completion rates in their online courses. While there are conflicting studies on course completion rates in online courses, course completion is an area of concern (Lawlor, 2007; Nelson, 2006; Pritchett, 2009). For the purpose of this study, course completion and retention are used interchangeably to indicate a student started and completed a course in a given semester.

Formula Funding

Texas public universities receive flexible, discretionary funds from the state based primarily on the formula funding calculation under the direction of the Texas Higher Education Coordinating Board (THECB). Of all the funds appropriated directly

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to Texas public universities, more than 62% comes from formula funding. The primary source of formula funding is generated by the instruction and operations formula. This formula is based on semester credit hours applied to a cost matrix identifying weights based on level of instruction (lower division, upper division, master, doctoral, or professional) and discipline (Liberal Arts, Science, Fine Arts, etc). The other formulas, teaching experience, small institution supplement, and infrastructure, also include semester credit hours but total less than 25% of formula funding for most universities (Texas Higher Education Coordinating Board [THECB], 2008). Current formula funding is based on the 12th day of class enrollments and does not take into account students who drop courses during the semester.

The need to retain students was important for Texas public universities because of a proposed shift toward using completed hours in the formula funding calculation (THECB, 2008). The transition to funding based on completed semester credit hours is intended to “encourage better outcomes from our universities” (THECB, p. 2). Continued growth of online courses and the perception that course completion rates are lower in online courses (Carr, 2000) provides evidence that retention in online courses could have a direct impact on public university funding.

Do student course completion and academic performance in online courses differ from traditional course offerings at Tarleton State University? If so, will the difference have a significant impact on university funding? What characteristics help determine student success in online courses? These questions will guide the research study with the following three objectives:

1. Describe the historical foundations of online education at a mid-sized public four-year university in Texas.
2. Determine if statistically significant differences exist between academic performance and course completion rates in students enrolled in online courses compared to students enrolled in traditional courses.
3. Develop a predictive model for determining successful completion of online courses.

Literature Review

Many studies of individual institutions indicated course completion and student performance were lower in online courses when compared to traditional classroom settings (Brady, 2001; Carr, 2000; Simpson, 2003). Anecdotal evidence and observations suggested this was the case, but data needed to be studied and systematically reviewed in order to draw a definite conclusion.

Roach (2002) reported a 40% annual growth in the online distance learning market. That growth combined with drop out rates that are 10-20% higher than traditional instruction (Carr, 2000) could signal problems for the future of online education.

Student persistence in online courses has been the subject of much research (Lawlor, 2007; McLaren, 2004; Morris, Finnegan, & Wu, 2005; Nelson, 2006). Some researchers focused on community colleges (Liu, 2007; Nelson; Pritchett, 2009), reported as the fastest growing segment in distance education (Allen & Seaman, 2008). However, with the increase in online course enrollments (Allen & Seaman) and the

proposed changes to formula funding based on completed semester credit hours (THECB, 2008); student retention was still vitally important to the economic viability of many small- to mid-sized public, four-year universities. Given the current economic impact on all publicly-funded institutions of higher learning, a need existed to better understand the effects of online enrollment and student course completion on state-based university budgets. This study examined historical data across multiple disciplines at Tarleton State University, Stephenville, Texas and compared student course completion and academic performance between online and traditional course delivery.

Kyger (2008) studied course retention rates of synchronous and asynchronous online courses. There were slight differences in retention rates between different delivery strategies, but Kyger found no significant difference in the student retention rates between the synchronous and asynchronous groups. However, Kyger found the asynchronous group actually had slightly better rates of student retention than the synchronous group. This finding is common when comparing student outcomes between different educational modalities (Russell, 2001). For the purposes of this study, specific online delivery strategies was not evaluated. Instead, the researcher compared any online delivered course to the equivalent traditionally delivered course.

Lawlor (2007) found that retention rates in online courses were comparable to other universities, but was not able to determine how the retention rates compared to traditional courses as the data were unavailable. Lawlor found that students met the common definition of the non-traditional adult learner. Students were generally employed full-time, had families, and were slightly older than the traditional students.

Age appeared to be a factor in retention in online courses as older students dropped more courses than did younger students.

McLaren (2004) conducted a comparison study of online and classroom business statistics courses and found that persistence in online courses was significantly different from traditional classroom courses. Student performance, as measured by the final course grade, was independent of the mode of instruction. This finding once again reinforces the no significant difference phenomenon (Russell, 2001) that states that student performance is not dependent on the mode of instruction.

Nelson (2006) conducted research on retention of students in online versus traditional courses at the community college. Her research supported the claim by many (Brady, 2001; Carr, 2000; Simpson, 2003) that retention in online courses was lower than it was in traditional course offerings. Additionally, her research found student demographics as a possible predictor of course completion. Nelson also noted that males had lower retention in online courses, but contrary to what Lawlor (2007) found, Nelson reported that the older students were more successful in online courses.

It was possible to retain a student throughout a course, and the student still earned a failing grade. While retention in this case was positive, the student had to retake the course or take a substitute course to earn academic credit. Morris, Finnegan, and Wu (2005) found approximately one-third of course completers in their study were classified as unsuccessful completers. The THECB has set a limit on the number of times a student can take the same course and the university still receives funding. The “Three-Peat” rule states that “Institutions shall not submit for formula funding any hours

for a course that is the same or substantially similar to a course that the student previously attempted for two or more times at the same institution” (Texas Administrative Code, Title 19, Part 1, Rule 13.105, 2005). Student success in the course is therefore important to the university’s economic health.

This study attempted to provide answers to the following questions: Were retention and student performance significantly different between online and traditional courses at Tarleton State University? If so, what student characteristics acted as reliable indicators of success? What were the possible financial implications of online student retention and course completion?

Purpose

The purpose of this study was to examine empirical data from Tarleton State University and determine if significant differences existed in course completion and student performance in online vs. traditional courses. A predictive model was created for determining student characteristics that influenced students’ successful completion of online courses.

Need for the Study

Mandated budget cuts for public universities combined with a proposed shift in formula funding placed increased importance on universities to maximize state funding. According to the THECB’s Higher Education Accountability System (n.d.), in fall 2008 the difference between total attempted semester credit hours (4,840,749) and total completed semester credit hours (4,577,428) at all public four-year universities was approximately 5.4%. The difference at Tarleton State University was approximately

5.8%. Tarleton State University was selected for this study due to availability of a large amount of archival data and the similarity to the state-wide difference in attempted and completed semester credit hours.

Objectives

The objectives of this study were to:

1. Describe the historical foundations of online education at Tarleton State University, Stephenville, Texas;
2. Determine if statistically significant differences existed between academic performance and course completion rates in students enrolled in online courses compared to students enrolled in traditional courses;
3. Develop a predictive model for determining successful completion of online courses.

Design

The research design was quantitative based upon archival data. This study used a causal-comparative research design to compare retention between groups of students in online and traditional courses. This same approach was used to compare student performance (measured by final grades) between students in online and traditional courses.

Causal-comparative designs do not allow for explicit finding of causation (Fraenkel & Wallen, 2006), but do strongly suggest whether mode of instruction has a direct impact on student retention. Additionally, since causal-comparative design takes

place after data are collected and without any manipulation or intervention, it allowed for the exploration of naturally occurring relationships between groups.

Population

The population ($N = 319,153$) for objective two consisted of all student course experiences in traditional and online courses taught during full, 16-week semesters from fall 2004 through spring 2009 at Tarleton State University. The population ($N = 15,097$) for objective three consisted of all student course experiences for students enrolled in online courses at Tarleton State University during full 16-week semesters from fall 2004 through spring 2009.

Sample

The sample unit for objective two was student course experience. Students enrolled in courses which had both an online and traditional section taught by the same professor in the same academic term were included in the sample. Only courses taught during full 16-week terms were used for the study.

The archival nature of the data allowed for complete analyses of all students' grades from the population for courses that had both an online and traditional section. In cases where there were no equivalent traditional courses, the online course retention and performance data were used for aggregate reporting but were not used as a comparison to the traditional course retention or performance data.

The sample unit for Objective three was student course experience. Objective three was to develop a predictive model for successful completion of online courses.

Course experience data for students enrolled in one or more online courses from fall 2004 through spring 2009 were included in the sample.

Data Collection

Archival data for the study were collected using the Banner Student Records System beginning in fall 2004 through spring 2009. Complete transcription information including demographics and application data for each student was collected and stored in a secured Oracle database. All students remained anonymous and information presented in the articles was in aggregate format only.

For the purpose of the study, only full 16-week semesters were used. Summer semesters and eight-week courses were excluded as they were not comparable in structure or design to a fall or spring course. Using data from courses delivered during the summer or eight-week terms could introduce extraneous variables that could threaten the validity of the study.

Data were extracted from the Oracle database without personally identifiable information. Data extracted included course term, course subject, course number, course section, delivery method, student college, student major, gender, age, ethnicity, grade classification (i.e. freshman, sophomore, junior, senior, post-baccalaureate, graduate, doctoral), student type (i.e. new freshman, transfer, continuing), cumulative grade point average (GPA), GPA hours completed, number of online courses completed, total courses completed, and final course grade.

Only courses delivered in a traditional lecture format (coded in Banner as LEC with a building code that is not 'online') or online (coded in Banner with a building code of 'online') were used for the study. Hybrid or blended learning courses were excluded.

Data Analysis

Descriptive statistics and data mining techniques were used to summarize both course completion and student performance in online and traditional courses. Data for the Banner Student Records System was stored in an Oracle database. Data were extracted from the Oracle database using the Structured Query Language (SQL). Data were aggregated and grouped into appropriate levels of detail using SQL. For objective two, data were aggregated at the course level. Specific data elements include course term, subject, number, section, delivery method, and counts of each grade code recorded for the course.

Course performance and course retention were both derived from the course grade data element. Course performance data were evaluated by examining grade codes of A, B, C, D, and F. Course retention data were evaluated by grouping grade codes into two categories: retained and not retained. A grade code of W (Withdrawn), WF (Withdrawn Fail), Q (Dropped), or K (Incomplete) indicated the student did not complete the course.

Due to the exploratory nature of this study, various statistical methods were used. Characteristics of data were examined using descriptive statistics. Additional analysis was conducted using inferential statistical tools.

Definition of Terms

Course retention was defined by the Center for the Study of College Student Retention as “the number of students enrolled in each credit course after the course census date and the number of students who successfully complete the course with an A-D grade at the end of the term.” (2009) For the purposes of this study, retention was defined as completion of the course signified by a final grade of A, B, C, D, or F. Grade codes of K, Q, W, and WF indicated the student did not complete the full semester and dropped or withdrew from the course. The final grade assigned to the course was used to account to eliminate I or incomplete grade codes. Course completion and retention were used interchangeably throughout the study.

Online Courses were courses delivered asynchronously using the Blackboard Learning System. These courses were delivered with no face-to-face meetings and had no designated room location other than ‘Online’ in the Banner Student Records System.

Traditional courses were courses delivered synchronously in the classroom. Course materials may have been distributed using Blackboard or some other means, but instruction was delivered face-to-face with both the students and instructor in the same room at the same time. These courses had a predetermined meeting time and place designated in the Banner Student Records System.

CHAPTER II

CASE STUDY OF THE FOUNDATIONS OF ONLINE EDUCATION AT TARLETON STATE UNIVERSITY

Introduction

The first documented example of a completely online educational program occurred in 1982 at the Western Behavioral Sciences Institute (WBSI) (Feenberg, 1993; Harasim, 2000). Since that time, online education has experienced rapid growth (Allen & Seaman, 2008). According to a survey conducted by the Sloan Foundation, there was a 35% growth in online enrollments from 2004 to 2005 (Allen & Seaman, 2006). As of fall 2007, more than 3.9 million students were enrolled in at least one online course representing more than 20% of all students in higher education (Allen & Seaman, 2007).

The student benefits of online education include flexibility, convenience, and in the case of non-traditional students, access to higher education (Lee, Cheung, & Chen, 2005; Matthews, 1999; Richardson & Swan, 2003; van Shaik, Barker, & Beckstrand, 2003). From the institution's perspective, benefits can include increased enrollment and reduced overhead from teaching traditional courses (Matthews).

Research about the origins of online education included the history of collaboration between researchers working on the Department of Defense's Advanced Research Projects Agencies network (ARPANET) (Harasim, 2000; Waldrop, 2008), the first online program offerings at the WBSI (Feenberg, 1993), and the growth of online course offerings among universities as an alternative delivery format (Allen & Seaman, 2008).

According to George Mollick, former director of the Center for Instructional Technology and Distributed Education (CITDE) at Tarleton State University, the adoption of online course delivery at Tarleton State University took several years and was the result of a push from the faculty (personal communication, February 17, 2010). As of fall 2008, roughly 13% of all students at Tarleton State University were enrolled in at least one online course. Despite the ubiquitous nature of online education, no research was found that clearly identified its origins and/or use as an educational delivery system at Tarleton State University.

Purpose and Objectives

The purpose of this study was to document the historical foundations for online education and to identify its growth at Tarleton State University, Stephenville, Texas.

Two objectives guided this study. The first objective was to describe the origins of online education as an extension of the broader field of distance education. The second objective was to describe the history and current state of online education at Tarleton State University.

History

Online course delivery may take many forms, but Harasim defines an online course as one whose primary mode of instruction takes place using the web (2000). Allen and Seaman (2008) defined an online course as “A course where most or all of the content is delivered online. Typically have no face-to-face meetings.” (p. 4) Additionally, an online course does not require a synchronous connection between the student and instructor. One of the most often cited benefits of online education is the

ability to take courses wherever and whenever it is convenient for the learner (Matthews, 1999; Richardson & Swan, 2003). Online courses also benefit the instructor by allowing them the freedom to administer and facilitate the course from their home or office and without the need to occupy a classroom.

To better understand the history of online education, the technologies that made it a reality are described in the following sections. The innovations that made online education possible included the Internet, e-mail, and the World Wide Web.

The ARPANET

The earliest widespread use of computer networks for collaboration between universities began with the creation of a multi-site network by the Advanced Research Projects Agency (ARPA) of the Department of Defense. This network came to be known as the ARPANET. The project started with a memo from Joseph Carl Robnett Licklider, head of the computer research program at DARPA, on April 23, 1963 (Waldrop, 2008). According to Bolt, Beranek, and Newman, Inc. (BBN, 1981), there were two original objectives for the ARPA Program:

- (1) To develop techniques and obtain experience on interconnecting computers in such a way that a very broad class of interactions are possible, and (2) To improve and increase computer research productivity through resource sharing.
- (p. 9)

Many of the technologies required to make the ARPANET a reality were already created and in use on smaller networks, but most needed additional refinement for use on the scale needed by the Department of Defense (BBN, 1981). After several years of

development and programming by the researchers at ARPA, the first message was sent via the ARPANET between UCLA and the Stanford Research Institute on October 29, 1969. By December 1970, the ARPANET consisted of 13 computers (nodes) connected via leased phone lines from AT&T. The phone lines provided an always-on connection between the different sites on the network. Leasing the existing phone lines from AT&T greatly reduced the installation costs of the network and is still a solution that is widely used today (Waldrop, 2008).

The Birth of Electronic Mail

In 1971, an electronic mail (e-mail) program for the ARPANET was created by Ray Tomlinson, one of the project leaders at BBN (Leiner et al., 1997). The concept of e-mail was not new at the time. Local e-mail was already being used on the time sharing computers at other ARPA projects. However, Tomlinson decided to implement e-mail on a larger scale so it could be used across the entire ARPANET. Since the ARPANET was comprised of multiple computers, a solution was required that would direct the e-mail to the correct user on the correct computer. Tomlinson's solution was to create a unique address for all recipients on the ARPANET. His solution is still the standard for all e-mail addresses: username@hostname (Hobbes, 2010; Waldrop, 2008).

E-mail took the place of interoffice memos and allowed someone to send an electronic message across physical barriers. No longer was it necessary to mail a letter or send typed memos through the U.S. postal physical delivery processes. It was not long before e-mail was the “most popular application on the network.” (Waldrop, 2008, p. 83)

Throughout the 1970s and 1980s, e-mail was used in educational settings first to facilitate information exchange and then as a way to supplement university-level courses (Harasim, 2000). For distance education purposes, e-mail and the growth of computer networks allowed universities to expand course offerings and reach students that would not normally have access to the universities facilities. Using the new technologies, the university could grow enrollments without necessarily having to add additional classroom space (Matthews, 1999).

For most of the 1970s online collaboration between student and teacher was largely limited to e-mail (Harasim, 2000; Matthews, 1999) or asynchronous delivery of information (Feenberg, 1993; Harasim). Starting in the 1980s, online collaborative learning using computer conferencing started to emerge. Using computer conferencing systems, students were able to interact synchronously and faculty began to adopt group learning activities (Harasim).

World Wide Web

Having worldwide communication and access to data was a huge breakthrough for instruction, collaboration, and research purposes. However, there was no easily accessible way for the effective management of the available data. Information was still stored on different systems and in different formats.

Several organizations were using a form of hypertext to link and organize data, but until 1989, no one had thought to link the use of hypertext with the Internet (Gillies & Cailliau, 2000). In March of 1989, Tim Berners-Lee created a proposal for what would become the World Wide Web. Berners-Lee was working for the European

Council for Nuclear Research (CERN) when he was given the freedom to explore and create the foundations of the World Wide Web. Using a NeXT computer system, Berners-Lee created the first web-browser and by December of 1990 had a working prototype of the web-browser and server (Gillies & Cailliau). This early browser did not support a mixture of graphics and text, but that innovation would soon follow.

In 1991, the Internet became available for commercial use (Gillies & Cailliau, 2000). While Internet and World Wide Web are used almost interchangeably in common language, the World Wide Web is just one branch of the broader Internet. Specifically the World Wide Web consists of all the HTML documents stored on all servers across the Internet that are transmitted using the Hyper Text Transfer Protocol (HTTP) (Gillies & Cailliau; Merriam-Webster.com.com, n.d.). Merriam-Webster's online dictionary defines the Internet as "an electronic communications network that connects computer networks and organizational computer facilities around the world" (n.d.).

Now that the Internet was available for commercial use and the World Wide Web facilitated the organization and distribution of content, the growth of distance education using online course delivery was ready to expand. In 1993, the Mosaic web browser was released (Andreessen & Bina, 1994; Hobbes, 2010) and was the first successful browser to deliver web content that contained graphics and text in a single web page (Andreessen & Bina). By 1995, the World Wide Web became the Internet service with the most traffic based on amount of data sent/received (Hobbes).

In the United States, less than 10 states had online education programs in 1992. By 2004, all 50 states had some form of online learning programs available at the college level (Lynch, 2004). According to a survey conducted by the Allen and Seaman (2008) in fall 2002, online enrollments represented 9.6% of the total number of students enrolled in degree-granting postsecondary institutions. In fall 2007, online enrollments as a percentage of total enrollment rose to 21.9%. The compound annual growth rate for online course enrollments from fall 2002 to fall 2007 was 19.7% (from 1.6 million in fall 2002 to 3.94 million in fall 2007). By contrast the annual growth rate for total enrollments was roughly 1.6% during the same period growing from 16.6 million students in fall 2002 to 19.97 million students in fall 2007 (Allen & Seaman, 2008).

Roughly 15% of the institutions involved in the Allen & Seaman survey (2008) began offering online courses prior to 1999, but 20% of the institutions included in the survey introduced online courses for the first time in 2007. The institutions that were early adopters of online education are also the institutions with the widest assortment of online course options. The early adopters were also the institutions with the largest online enrollments (Allen & Seaman, 2008).

The adoption/diffusion of a technological innovation categorizes adopters into five categories: innovators, early adopters, early majority, late majority, and laggards (Rogers, 1995). Mytinger suggested that size of an organization was “perhaps the most compelling concomitant to innovativeness” (as cited in Rogers, 1995, p. 409). According to Rogers (1995), larger organizations tend to be more innovative because larger organizations typically have more resources, technical expertise, and other

characteristics that allow for increased innovativeness. The generalization that larger organizations tend to be more innovative was supported by the research about online course offerings conducted by the Sloan Consortium (Allen & Seaman, 2006; Allen & Seaman, 2007; Allen & Seaman, 2008).

Online Education at Tarleton State University

In the fall of 2008, Tarleton State University had a total unduplicated headcount of 9,634 students across all campus locations. The Sloan Consortium classifies universities by size into five categories: Under 1,500; 1,500 – 2,999; 3,000 – 7,499; 7,500 – 14,999; and over 15,000 (Allen & Seaman, 2006; Allen & Seaman, 2007; Allen & Seaman, 2008). Using the Sloan categories, Tarleton State University would be categorized into the group of large universities. Does the adoption of online education at Tarleton State University align with the assertion by Rogers (1995) and Mytinger that larger organizations tend to be more innovative?

According to Nick Lilly, Tarleton State University's Manager of Classroom and Lab Support in the Center for Instructional Technology and Distributed Education (CITDE), Tarleton began offering online courses in fall 1996. Templates were developed with outside assistance from West Texas A&M University and the courses were delivered using online bulletin board software. The first courses to transition to the online format were technical writing and introduction to literature. However, no courses were officially listed as "online" in a course catalog until 1998 (personal communication, January 16, 2010). From those early beginnings, online course offerings have grown steadily.

In academic year 2009, Tarleton offered 342 courses totally online (see Figure 2.1), which represented a 139% increase in the number of courses offered online from academic year 2005. During the same period, traditional course offerings also grew, but at a decreased rate of 3% (see Figure 2.2). For purposes of this article, online courses included only those courses taught with an instruction code of “lecture” and a building code of “online.” Traditional courses were defined as courses with a building code other than “online” and with an instruction code of “lecture.” Hybrid courses were indicated with an instruction code of “lecture with online components” and were not included in this study.

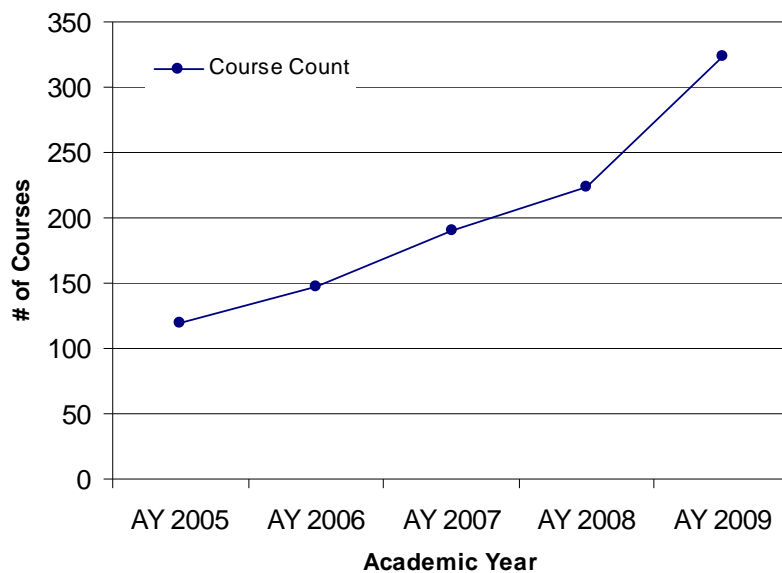


Figure 2.1. Online course offerings at TSU from academic year 2005 through academic year 2009.

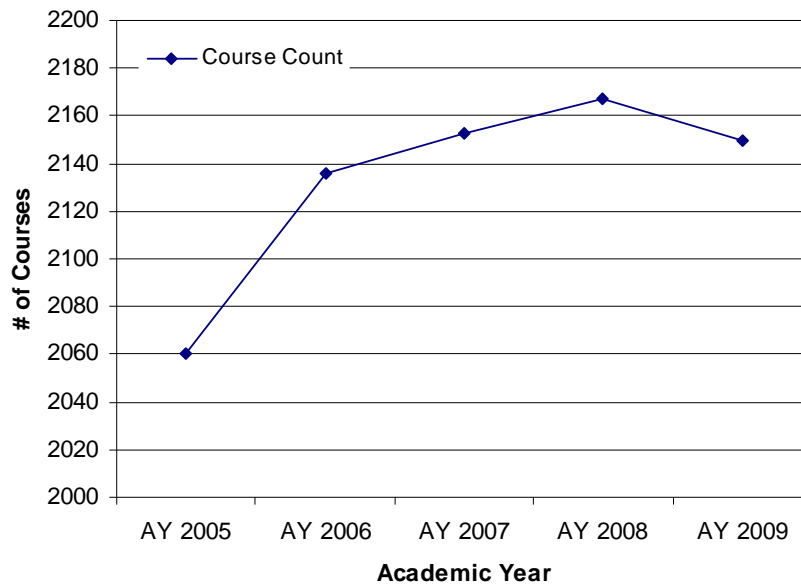


Figure 2.2. Traditional course offerings at TSU from academic year 2005 through academic year 2009.

Overall enrollment in online courses remained steady at an average of 14 students per course in fall 2004 to 15 students per course in fall 2008. For the 2008 fall semester, 11.4% of all students were enrolled in one or more online courses compared to 6.6% in the fall of 2004 (see Table 2.1).

Table 2.1

Total and Online Enrollment Fall 2004 – Fall 2008

Semester and Year	Total Enrollment	Students Taking at Least one Online Course	Online Enrollment as a Percent of Total Enrollment
Fall 2004	9,033	596	6.6
Fall 2005	9,140	567	6.2
Fall 2006	9,464	665	7.0
Fall 2007	9,460	835	8.8
Fall 2008	9,634	1095	11.4

In the fall of 2004, there were 596 students taking at least online course at Tarleton State University. In that same semester 7,038 students were enrolled in at least one lecture-based traditional course. In all, 404 students were taking both online and traditional lecture-based courses with 147 students only taking lecture-based online courses.

By the fall of 2008, 1,095 students were taking at least one online course at Tarleton State University, which represented an 86.2% increase in online enrollments. Overall university enrollment grew 6.6% from 9,033 in the fall of 2004 to 9,634 in the fall of 2008. The growth of enrollments in online course offerings at Tarleton State University followed the growth trend noted in the Sloan reports with online enrollments growing at a faster rate than overall enrollments (Allen & Seaman, 2006; Allen & Seaman, 2007; Allen & Seaman, 2008).

Research indicated that institutions considered online course offerings as more cost effective and convenient than traditional course offerings (Matthews, 1999; Richardson & Swan, 2003). Tarleton State University invested in technology and resources to support continued growth in online course enrollments. The growth of online programs resulted in increased semester credit hour generation. According to the Tarleton State University (n.d.) online Fact Book, online courses generated 1,581 semester credit hours in fall 2002. By fall 2008, online semester credit hours had increased to 5,720. The 2007-2009 strategic plan states as part of outreach and off-campus initiatives Tarleton State University will, “Extend services through development of off-campus, on-line, continuing education, and community education learning opportunities” (Tarleton State University Planning Council, 2007, p. 9).

From fall 2004 to fall 2008, Tarleton State University expanded online course and program offerings to meet the increased demand from students and to tackle growing pressure to reduce costs while maintaining academic accreditation and funding. Pressure from for-profit online universities increased the need for Tarleton to continue growth of online courses and programs in order to remain competitive and attract students. According to Brad Chilton, Vice President of Enrollment and Information Management, Tarleton State University had a traditional student base from the 42 county area surrounding Stephenville (personal communication, May 13, 2010). With the change in demographics and decrease in population of the traditional student base, Tarleton invested in online course delivery and online program development as a means to attract and retain students.

As of fall 2008, Tarleton State University offered both undergraduate and graduate courses online. In fall 2009, the Texas Higher Education Coordinating Board and The Texas A&M University System authorized Tarleton State University to offer a Masters Degree in Criminal Justice as an online program starting in Spring 2010. In total, Tarleton State University offers seven online Masters Degree programs.

Additionally, Tarleton was developing 11 online undergraduate degree completion programs across several disciplines. Tarleton State University will continue to explore opportunities to expand online course offerings in an attempt to reduce costs and to meet the needs of students.

State of Texas Funding

In a 2010 memo from the Texas Governor's office, state agencies were asked to reduce their general revenue and general revenue-dedicated appropriations by 5% for the 2010-2011 biennium (Governor Rick Perry, personal communication, January 15, 2010). Public universities are considered state agencies and have also been tasked with the 5% reduction. The total planned reduction for Tarleton State University was \$2,768,951. The proposed cuts to the Tarleton budget were in three primary areas: Purchased utility savings, operations and maintenance reductions, and position savings. The majority of the reduction, approximately 1 million dollars each fiscal year, comes from position savings realized by a hiring freeze, position reclassifications, and possible elimination of vacant positions. These cuts met the short term goal of the 5% reduction. However, due to economic uncertainty, Tarleton State University worked to identify more long-term cost saving strategies.

Online course delivery was one avenue university administrators explored to reduce some of the costs associated with instruction while continuing to serve the needs of the students, faculty and staff. The initial resource requirements to setup online course delivery are often cited as a disadvantage of offering online courses (Matthews, 1999; Williams, Nicholas, & Gunter, 2005). However, once the infrastructure is in place, online course delivery potentially provides a means to deliver instructional content at a reduced cost (Batts, Friend, & Dunn, 2009). There are still costs associated with online course delivery. The need for instructional designers, course facilitators, and personnel to maintain the hardware and software systems are still required. According to Credence Baker, current director of the CITDE at Tarleton State University, the total administrative and technical cost per online course for the 2008-2009 academic year was approximately \$1,105 (personal communication, February 26, 2010).

The cost savings with online course delivery are realized through savings on the classroom facilities and overhead associated with a traditional face-to-face course (Matthews, 1999; Richardson & Swan, 2003). According to Joe Standridge, Associate Vice President of Physical Facilities at Tarleton State University, the utility and maintenance annual cost of instructional space for the 2008-2009 academic year was approximately \$3.25 per square foot. Utility and maintenance cost were still paid on facilities required to host servers and equipment used for online course delivery; however, Standridge suggested that the cost per square foot drops approximately \$2.00 for each course taught online (personal communication, February 26, 2010).

Online courses potentially reach a student base that may not otherwise attend the university (Rivera & Rice, 2002). According to the Tarleton State University online tuition and fee calculator, a three-hour online course would produce \$625 in tuition and fees. In the fall of 2008, there were 290 students taking only online courses. These students contributed approximately \$181,247 in tuition and fees to Tarleton State University. Additionally, Tarleton State University offered 342 online courses during the 2008-2009 academic year. By offering these 342 courses online, the university reduced the utility and maintenance costs and met the needs of some students that may have otherwise selected a different university.

In addition to the potential cost benefits to Tarleton State University, research indicates online education has benefits for the student as well. Benefits often cited with online course delivery are increased access to higher education (Matthews, 1999), self-paced learning (Lee et al., 2005), flexible schedule (Matthews), accessible anytime (Lee et al.; van Shaik et al., 2003), and accessible anywhere (Lee et al.; van Shaik et al.). With the aforementioned benefits, does online course delivery lead to increases in course completion and student performance? What student characteristics are useful predictors of student success in online courses? Additional research comparing online and traditional course delivery is needed to address these questions.

Conclusion

While documented evidence about the exact origin of online course delivery at Tarleton State University could not be found, anecdotal evidence suggests that Tarleton State University started teaching online courses in the mid-to-late 1990s. The initial

courses were developed by faculty and technical staff that had the foresight to realize that online course delivery was a way to meet the needs of both faculty and students. The growth of online courses at Tarleton State University is not uncommon compared to public universities of comparable size (Allen & Seaman, 2008).

With state mandated budget reductions, Tarleton State University can potentially generate cost savings by increasing online course offerings. The Texas Higher Education Coordinating Board (THECB) has also recently made recommendations that formula funding for public universities switch from funding based on attempted semester credit hours to funding based on completed hours (THECB, 2008). There was conflicting research on course completion rates between online and traditional course delivery (Brady, 2001; Carr, 2000; Roach, 2002; Simpson, 2003). However, any shift in the THECB formula funding that could result in lower funding from the state is an important consideration for public universities. Additional research should be conducted into course completion rates between online and traditional courses and the potential impact to university formula funding.

CHAPTER III

COMPARISON OF COURSE COMPLETION AND STUDENT PERFORMANCE THROUGH ONLINE AND TRADITIONAL COURSES

Introduction

In the fall of 2007, more than 17.9 million students were enrolled in degree-granting, postsecondary institutions. Of those students, more than 3.9 million were enrolled in one or more online courses. Online enrollments represented 21.9% of total enrollments. From fall 2002 to fall 2007, online enrollments grew at a compound annual growth rate of 19.7% from 1.6 million to more than 3.9 million (Allen & Seaman, 2008). With the growth of online course enrollments, questions have been asked about course completion and student performance in online courses compared to traditional, face-to-face courses.

Russel (2001) compiled an annotated bibliography of 355 research reports that examined differences in student outcomes between online and traditional courses. The majority of research revealed no significant difference in student outcomes based on delivery mode. However, recent research on course completion and performance has been inconsistent. Brady (2001), Carr (2000), and Simpson (2003) found that course completion was generally lower in online courses when compared to traditional courses. Roach (2002) found that some institutions reported equal or higher course completion rates in online courses when compared to traditional courses.

Growth in online course enrollments is clear and many researchers agree that the future of higher education is tied to some form to online course delivery (Berger &

Lyon, 2005; Harasim, 2000; Palloff & Pratt, 2003). Are course completion rates significantly different between online and traditional courses? Is a student's academic performance independent of the course delivery method? These questions are important to administrators tasked with maintaining the competitive and economic future of their respective universities and are the focus of this research.

Formula Funding

Texas public universities receive flexible, discretionary state funds based primarily on the formula funding calculation under the direction of the Texas Higher Education Coordinating Board (THECB). Of all the funds appropriated directly to Texas public universities, more than 62% comes from formula funding. The primary source of formula funding is generated by the instruction and operations formula. This formula is based on semester credit hours applied to a cost matrix identifying weights based on level of instruction (lower division, upper division, master, doctoral, or professional) and discipline (Liberal Arts, Science, Fine Arts, etc...). The other formulas, Teaching Experience, Small Institution Supplement, and Infrastructure, also include semester credit hours, but total less than 25% of formula funding for most universities (THECB, 2008). Current formula funding is based on the 12th day of class enrollments and does not take into account students who drop courses during the semester.

In the state of Texas, course completion rates have become important with regards to funding. The THECB recommended a shift in formula funding for the 2010-2011 biennium. The proposal would change the funding formula from using attempted

to completed semester credit hours (THECB, 2009). With the continued growth of online education and the proposed shift in funding, course completion rates in online courses became increasingly important to administrators at Texas public universities.

Another State of Texas rule for public university funding related to the number of times a student can repeat a course, commonly referred to as the “Three-Peat” rule (Texas Administrative Code [TAC], Title 19, Part 1, Rule 13.105, 2005). This rule has an impact on the student and university. The three-peat rule states that “Institutions shall not submit for formula funding any hours for a course that is the same or substantially similar to a course that the student previously attempted for two or more times at the same institution” ([TAC], Title 19, Part 1, Rule 13.105, 2005). In order for the university to compensate for the loss of funding, the student can be charged full out-of-state tuition cost for any course impacted by the three-peat rule. The three-peat rule increased the importance of student academic performance to avoid potential loss of state funding for the course and possible increased financial burden on the student.

Course Completion

Research on course completion rates between online and traditional course delivery has been mixed (Carr, 2000). Several studies showed differences existed in course completion rates between online courses and traditional, face-to-face courses (McLaren, 2004; Paden, 2006; Roach, 2002). Waschull (2001) found that online course completion rates were not significantly different from traditional course completion rates. Nelson (2006) compared course completion rates between online and traditional courses at Delaware Technical and Community College, Terry Campus. Her research

found significant differences in the course completion rates between online and traditional courses. Additional analysis showed that more students (23%) withdrew from the online courses compared to the withdrawal rate in traditional courses (18.4%).

Carr (2000) noted that some universities reported drop-out rates as high as 80% in online courses, but argued that course completion rates should not be compared across universities since universities report course completion rates differently. Some universities included students who dropped during the add/drop period while other universities did not report those instances. Without having a standard rule, a comparison across universities might not produce accurate results. Regardless of the ability to compare across universities, research into course completion rates is useful to university administrators tasked with determining class size and number of sections as well as those administrators responsible for assessing student learning outcomes for internal and external agencies (McLaren, 2004).

Student Performance

Russell (2001) explored 355 research reports comparing student outcomes between different course delivery modes. The majority of the research indicated no significant differences existed in student outcomes based on delivery mode. Clark (1994) stated that it was the teaching methods and not the delivery medium used that influenced learning. In all cases, Clark argued that the selection of course delivery mode should be an economic decision (Clark).

Much research exists supporting Russell's (2001) work (Clark, 1994; Gagne & Shepherd, 2001; McLaren, 2004). However, several recent studies have found

significant differences in student outcomes based on delivery type (Faux & Black-Hughes, 2000; Paden, 2006; Shoenfeld-Tacher, McConnel, & Graham, 2001). Paden found a significant difference in student performance between online and traditional courses. Faux and Black-Hughes conducted research into student performance between different delivery modes of a social work course and found that a significant difference existed between post-test scores by delivery mode. Additional analysis indicated that students in the online section did not perform as well as students in the traditional section.

Course Completion by Discipline

Several researchers found that certain disciplines were work suited for an online setting (Carnevale, 2003; Nelson, 2006; Noble, 2004; Paden, 2006; Smith, Heindel, & Torres-Ayala, 2008). Lab science, health care (Carnevale, 2003), and mathematics (Smith et al, 2008) courses have all been identified as course disciplines that are not well-suited for online course delivery. Terry (2001) suggested that courses such as accounting, economics, computer information systems, marketing and management were potentially more conducive to online course delivery.

Smith et al. (2008) compared attrition rates between mathematics-related courses and non mathematics-related courses and found higher attrition rates in the mathematics-related courses. Attrition in traditional mathematics-related courses was the same as the drop-out rates in non mathematics-related courses. The researchers suggested that “for online students, mathematics is not working as well as other disciplines online, and

further, students' difficulties with mathematics relative to other disciplines are not as great as in the face-to-face modality” (p. 152).

Online course delivery has been a growing area in higher education (Allen & Seaman, 2008). As universities continue to transition courses to online delivery, it is important to understand the impact on student performance and retention. Is student performance in online courses comparable to performance in traditional courses? Are there differences in course completion in online courses when compared to traditional courses? Are some disciplines more appropriate for online delivery?

Purpose and Objectives

The purpose of the study was to compare course completion rates and student performance between online and traditional courses. The following research objectives were used to guide the study:

1. Determine if there was a statistically significant difference in the performance of students enrolled in online courses compared to students enrolled in traditional courses.
2. Determine if there was a statistically significant difference in the retention of students enrolled in online courses compared to students enrolled in traditional courses.
3. Determine if there was a statistically significant difference in the retention of students enrolled in online courses by course discipline.

Methodology

The research design was quantitative. This study had a causal-comparative research design, using archival data, to compare both course completion and student academic performance (measured by final grades) between groups of students in online and traditional courses. This same approach was used to compare course completion of students enrolled in online courses by course discipline.

Causal-comparative designs do not allow for explicit finding of causation (Fraenkel & Wallen, 2006), but do strongly suggest whether mode of instruction had a direct impact on student retention. Additionally, since causal-comparative design takes place after data were collected and without any manipulation or intervention, it allowed for the exploration of naturally occurring relationships between groups.

The population ($N = 319,153$) for this research was student course experiences for students enrolled in all 16-week courses taught between fall 2004 and spring 2009. Summer semesters were excluded as they are not comparable in structure or design to a fall or spring course (Nelson, 2006). Online courses as defined by Allen and Seaman (2008) were those courses “in which at least 80 percent of the course content is delivered online” (p. 4). For the purpose of this research, online courses were defined as those courses designated in the Tarleton State University Banner Student Records System with an online building designation. Traditional courses were defined by Allen & Seaman (2008) as courses “with no online technology used – content is delivered in writing or orally” (p. 4). For the purpose of this research, traditional courses were defined as those

courses designated in the Banner Student Records System with a building code other than online and with an instruction code of “lecture.”

For objective one, a purposive sample was selected that consisted of all student course experiences for students who were enrolled in and completed courses taught in both an online and traditional lecture format by the same professor during the same semester and year ($n = 5,477$). The total number of distinct students enrolled in the courses from the sample was 4,120.

For objective two, a purposive sample was selected that consisted of all student course experiences for students enrolled in courses taught in both an online and traditional lecture format by the same professor during the same semester and year ($n = 5,778$). The total number of distinct students enrolled in the courses from the sample was 4,307.

For objective three, the sample included all student course experiences for students enrolled in online courses taught consistently during each of the 16-week semesters between fall 2004 and spring 2009 ($n = 8,445$). Of the 41 subject areas with courses delivered between fall 2004 and spring 2009, only 14 subject areas were delivered during each of the semesters between fall 2004 and spring 2009. The total number of distinct students enrolled in courses from the sample was 3,932.

Data for the research objectives were extracted from the Tarleton Banner Student Records System using the Oracle Structured Query Language (SQL). For objectives one and two, all courses taught during full 16-week semesters were identified and extracted into a temporary table. Using the temporary table as the research sample,

an SQL statement was written to find all courses with both online and traditional sections taught by the same professor during the same semester and year. With the sample courses identified, course delivery mode, registration status and final grade were extracted for all students enrolled in the sample courses. No student identifying information was included in the data extraction.

For objective one, a comparison of student academic performance, all students with a registration status code other than dropped or withdrawn were included in the sample. This objective was intended to measure academic performance, only students who completed the course were included. Student academic performance was measured by the final course grade.

For objective two, a comparison of course completion, all students enrolled in the sample courses were used. Students with a grade code of A, B, C, D, or F and registration status other than dropped or withdrawn were flagged as retained and all others were flagged as not retained.

For objective three, a comparison of online course completion by course discipline, data extracted included registration status, final grade, and course subject for all students enrolled in all online courses identified in the initial base course table. Course discipline was defined as the subject area a course was associated with for a particular college and department. Subject areas were designated by a four character abbreviation and assigned to all courses listed in the Tarleton State University Course Catalog.

Pearson's Chi-Square test was used to determine if significant differences existed in retention or performance by mode of instruction. "Chi-square is the inferential technique used to determine statistical significance of a relationship" (Wallen & Fraenkel, 2001, p. 530). An alpha level of .05 was set *a priori* to determine if an association existed between the independent variable – delivery mode – and the dependent variables retention and performance. For objective three, a chi-square test was calculated on all students enrolled in online courses to determine if there was a significant difference in the expected and observed retention by course discipline.

Results

Objective one was to determine if a significant difference existed in academic performance of students enrolled in online courses compared to students enrolled in traditional courses. A chi-square analysis was performed in SPSS to determine if there was a significant difference in student performance between students enrolled in online courses and students enrolled in traditional courses. Students enrolled in online courses had the highest percentage of As at 34.6% compared to students enrolled in traditional courses at 31.3%. Table 3.1 displays the grade distribution by course delivery modality. The difference in performance was statistically significant, $\chi^2 (4, N = 5,477) = 27.383, p < .05$ (see Table 3.1).

Table 3.1

Contingency Table for Students' Academic Performance (N = 5,744)

Modality	A	B	C	D	F	Total
Online	631	562	296	141	195	1,825
Traditional	1,142	1,180	762	270	298	3,652
Total	1,773	1,742	1,058	411	493	5,477

Note. $\chi^2 = 27.383$, critical value = 9.49, d.f. = 4

Objective two was to determine if there was a significant difference in the retention of students enrolled in online courses compared to students enrolled in traditional courses. A chi-square analysis was performed in SPSS to determine if there was a significant difference in course completion between students enrolled in online courses and students enrolled in traditional courses. Students enrolled in online courses had the lowest course completion rates at 93.3% compared to students enrolled in traditional courses at 95.6%. Table 3.2 displays the course completion distribution by course delivery modality. The difference in retention was statistically significant, $\chi^2 (1, N = 5,778) = 14.132, p < .05$ (see Table 3.2).

Table 3.2

Contingency Table for Course Completion Rates (N = 5,778)

Modality	Retained	Not Retained	Total
Online	1,825	132	1,957
Traditional	3,652	169	3,821
Totals	5,477	301	5,778

Note. $\chi^2 = 14.132$, critical value = 5.99, d.f. = 2

Objective three was to determine if there was a significant difference in the retention of students enrolled in online courses by course discipline. A chi-square analysis was performed in SPSS to determine if there was a significant difference in students' course completion by course discipline. The 14 different disciplines included in the chi square analysis were accounting, agricultural education, computer information systems, English, finance, general business, health, human resource management, management, marketing, physical education, psychology, reading, and special education. Finance had the lowest course completion rate at 82.2% compared to Reading with the highest retention rate at 98.2%. The difference in retention by course discipline was statistically significant, $\chi^2 (13, N = 8,445) = 96.974, p < .05$ (see Table 3.3).

Table 3.3

Contingency Table for Course Completion by Course Discipline (N = 8,445)

Modality	Retained	Not Retained	% Retained	Total
Computer Information Systems	1,311	118	91.7	1,429
General Business	1,187	88	93.1	1,275
Management	1,000	81	92.5	1,081
Psychology	924	93	90.9	1,017
English	654	63	91.2	717
Physical Education	450	23	95.1	473
Marketing	417	33	92.7	450
Special Education	386	16	96.0	402
Health	339	11	96.9	350
Human Resource Management	278	40	87.4	318
Finance	245	53	82.2	298
Agricultural Education	271	22	92.5	293
Accounting	151	24	86.3	175
Reading	164	3	98.2	167
Totals	7,777	668	92.1	8,445

Note. $\chi^2 = 96.974$, critical value = 22.36, d.f. = 13

Conclusions and Recommendations

The growth rate of student enrollments in online courses is outpacing the growth rate of the total higher education student population (Allen & Seaman, 2008). Research

on the course completion rates in online education is mixed. Some research has found course completion in online courses was as good as or better than in traditional courses (Roach, 2002). Other researchers have found that traditional courses have higher course completion rates when compared to online equivalents (Brady, 2001; Carr, 2000; Simpson, 2003).

Course completion and student performance has financial impacts on students as well as the university. The THECB (2009) proposed a shift in formula funding from attempted to completed semester credit hours. Additionally, the Texas Administrative Code dictates that a university “shall not submit for formula funding any hours for a course that is the same or substantially similar to a course that the student previously attempted for two or more times at the same institution” ([TAC], Title 19, Part 1, Rule 13.105, 2005). To compensate for the loss of state funding, the university could charge tuition up to the out-of-state tuition rates for the course.

Objective one sought to determine if significant differences existed in student performance between online and traditional courses. A chi-square analysis on the dataset indicated that a significant difference did exist in the student performance between online and traditional courses. This finding supports previous research on student performance in online courses (Faux & Black-Hughes, 2000; Paden, 2006; Shoenfeld-Tacher, McConnel, & Graham, 2001). Additional observation of the grade frequencies found a higher percentage of As, Ds, and Fs in online courses, while traditional courses had a higher percentage of Bs, and Cs. Shoenfeld-Tacher et al. found student academic performance as measured by a post-test in an online science course

was significantly different and superior to student performance in the traditional course section. Paden found that student academic performance in an introductory math course was significantly different between online and traditional delivery. Contrary to what Shoenfeld-Tacher et al. found, Paden noted academic performance of students enrolled in the traditional section of the introductory math course was superior to students enrolled in the online section.

With regard to objective two, significant differences did exist in course completion rates between online and traditional course delivery. This finding supports research conducted by McLaren (2004), Paden (2006), and Roach (2002) who found differences in course completion rates between online and traditional courses. Additional analysis indicated that students enrolled in online courses had a lower course completion rate (93.3%) than students enrolled in traditional courses (95.6%). This supports research by Paden who found that traditional course delivery had a higher retention rate compared to online delivery for students enrolled in an introductory math course. Nelson (2006) found significant differences in student retention rates between online and traditional course delivery.

With regard to objective three, significant differences existed in course completion rates by course discipline. Additional observations supported previous research that suggested some disciplines may not be well-suited to online delivery (Carnevale, 2003; Nelson, 2006; Noble, 2004; Paden, 2006; Smith, Heindel, & Torres-Ayala, 2008). Course completion varied by discipline with reading having the highest rate at 98.2% and finance with the lowest at 82.2%. Nelson examined course completion

rates for nine disciplines and found that no significant differences existed for seven of the disciplines. However, significant differences did exist in criminal justice and psychology and Nelson suggested that these course disciplines might not be conducive to online delivery. Smith et al. (2008) compared online and traditional course completion rates in mathematics courses and found lower retention rates in online mathematics courses. The researchers suggested that mathematics might not be appropriate for online delivery.

The research was conducted using archival data from the Tarleton State University Banner Student Record System. No data was available on student perceptions of the courses or student aptitude with the technology used for course delivery. Additional student characteristics such as age, gender, ethnicity, classification, major, and experience with online course delivery were not evaluated as part of this research. What type of student is likely to succeed in online courses? Does experience with the technology lead to greater course completion and improved student performance in online courses? More research into student characteristics could help identify possible variables to predict student success in online courses.

CHAPTER IV

SUCCESS FACTORS: A PREDICTIVE MODEL FOR STUDENT ACADEMIC SUCCESS IN ONLINE COURSES

Introduction

From fall 2002 to fall 2007, growth of online course enrollments outpaced the overall growth of student enrollments in higher education (Allen & Seaman, 2008). Much research has been done in the area of online student performance (Deberard, Spielmans, & Julka, 2004; Holcomb, King, & Brown, 2004; Lawlor, 2007; Liu, 2007; Lu, 2003; Nelson, 2006; Neuhauser, 2002; Paden, 2006; Welsh, 2007), but results on the efficacy of online course delivery were mixed (Carr, 2000).

Factors such as age (Deberard et al., 2004; Lawlor, 2007; Lu, 2003; Nelson, 2006; Neuhauser, 2002; Porta-Merida, 2009; Welsh, 2007), gender (Lawlor; Liu, 2007; Lu; Nelson; Neuhauser; Paden, 2006; Porta-Merida; Welsh), ethnicity (Lu; Nelson; Porta-Merida; Welsh), prior experience with online courses (Holcomb et al., 2004; Lawlor; Neuhauser; Porta-Merida; Welsh), student classification (Pineau, 2007; Porta-Merida; Welsh), Grade Point Average (GPA) (Artino, 2007; Gerlich, Mills, & Sollosy, 2009), and course load (Welsh) have all been cited as possible predictors of student performance in online courses.

Age was cited frequently as a variable of student academic success in online courses (Deberard et al., 2004; Lawlor, 2007; Lu, 2003; Nelson, 2006; Neuhauser, 2002; Porta-Merida, 2009; Welsh, 2007). However, the findings on age as an indicator of academic success were mixed. Pineau (2007) indicated older students tended to have a

higher GPA in online courses. Neuhauser found no significant relationship between age and course completion when comparing online and traditional sections of the same course. However, Neuhauser found attrition rates were higher in students age 18 to 22. Lawlor found older students aged 25 to 29 had higher drop out rates while students under age 19 had lower drop out rates.

Nelson (2006) grouped students enrolled in online courses into three groups: 22 and younger, 23 to 28, and 29 and older. A significant difference was found in the course completion rate of students across the age groups. Fewer students than expected age 28 and younger completed the coursework while students age 29 and older completed more coursework than expected. Porta-Merida (2009) performed a frequency analysis on demographics of students enrolled in online courses at a private medium sized university in Florida and found the most frequent age for retained students was 31 years old. In a similar analysis, Welsh (2007) found the most frequent age of students withdrew from online courses was 24 years old, but indicated age was not a useful predictor of success in online courses.

Gender was often indicated as a variable linked to student performance in online courses. The role of gender on performance in online courses was not consistent. Several studies found higher attrition rates among males (Lawlor, 2007; Nelson, 2006; Porta-Merida, 2009) while other research found no significant relationship between gender and course completion (Paden, 2006). Welsh (2007) found gender was not statistically significant and not a useful predictor of persistence, but indicated more male

students persisted in online courses compared to female students. However, Pineau (2007) found female students enrolled in online courses tended to have higher a GPA.

Several studies indicated ethnicity as a factor of student academic success in online courses (Lu, 2003; Nelson, 2006; Porta-Merida, 2009; Welsh, 2007). However, most of the research indicated differences were only found between Caucasian and African-American students. Lu investigated student performance in two online graduate MIS courses and found ethnicity had a minor impact in academic performance. Performance was significantly higher among Caucasians when compared to African-Americans, but all other comparisons by ethnicity were not significant. Nelson supported Lu's findings and indicated a significant difference in retention between Caucasian students and African-American students with more Caucasian students completing coursework. Welsh indicated ethnicity was not a useful predictor of online student success, but noted the odds of success were 10% higher for non-minorities compared to minority students. Porta-Merida confirmed the previous research and found white students were most likely to persist in online courses.

Prior experience is often cited as a useful predictor of success in online courses (Holcomb et al., 2004; Lawlor, 2007; Neuhauser, 2002; Porta-Merida, 2009; Welsh, 2007). According to Neuhauser, "a variable that might affect whether a student selected an online course or an FTF course, as well as success in an online course, would be prior experience with technology-enhanced or online courses" (p. 104). Lawlor found prior experience in online courses lead to improved course completion. Holcomb et al. found previous experience had a significant difference on distance education self-efficacy.

Welsh found prior experience was a significant predictor of student success in online courses. However, Lu (2003) found the number of distance courses completed did not have a significant impact on performance in online courses.

Student classification and level were often referenced as useful variables for predicting success in online courses (Pineau, 2007; Porta-Merida, 2009; Welsh, 2007). Pineau suggested junior and senior level students may tend to perform better in online courses compared to students classified as freshman or sophomore. Welsh indicated the odds of success in an online course increased for students with prior college compared to first-time students. However, student classification was not a statistically significant and was therefore not a useful predictor of student success in an online course. However, Porta-Merida contended freshman were the most likely to remain in school and enrolled in online courses.

In a study on the predictors of achievement in a self-paced online course, Gerlich, Mills, and Sollosy (2009) found GPA was a significant predictor of student outcomes. The research confirmed the findings of Artino (2007) who previously asserted GPA as a significant predictor of student success.

Little research was found on the impact of course load on student performance. However, Welsh (2007) found course load was a useful predictor of student success in online courses. Students enrolled in only one online course were less likely to persist and succeed in the course compared to students enrolled in more than one course.

According to Holcomb et al. (2004), “the implications of student characteristics that contribute to online course success are critical for schools across the country that are

creating classes for online delivery and offering them to wider audiences” (p. 12). However, Liu (2007) found “there is no single indicator that can effectively predict online course retention and final grade” (p. 137). Several researchers built models to predict success in online courses based on a combination of factors (Deberard et al., 2004; Liu, 2007; Welsh, 2007). The current study built on the existing literature to develop a predictive model for online academic success based on archival data for students at Tarleton State University.

What were the demographics of students enrolled in online courses at Tarleton State University between fall 2004 and spring 2009? What factors were shown to affect student academic performance and course completion? These questions are important to university administrators and student advising personnel responsible for providing a challenging and rewarding experience to the students at Tarleton State University.

Purpose and Objectives

The purpose of the study was to develop a predictive model of academic success for students enrolled in online courses. The following research objectives were used to guide the study:

1. Describe the demographic characteristics of students enrolled in online courses.
2. Determine if significant relationships exist between student demographic characteristics.
3. Develop a predictive model of academic success for students enrolled in online courses.

Methodology

The research design was descriptive and correlational. This study used archival data to develop a model using student level data to predict successful completion of online courses. Successful completion was defined as a student persisting throughout the semester and receiving a final course grade of A, B, or C. Unsuccessful completion was defined as failure to complete the course or receiving a grade code of D, F. A final course grade of D was considered passing; however, for this study a grade of D was classified as unsuccessful completion since courses where the student earned a D are not always transferrable to other universities and students must maintain a C average in required courses for their major (Tarleton State University, 2009).

All data were archived in an Oracle database populated by the Banner Student Records System. Data were extracted using the Structured Query Language (SQL) with the All-Around Automation software package PL/SQL Developer. All courses designated with an ONLINE building code were identified and used as the basis to extract student level data. No personally identifiable information was included in the data extract. Analysis for each of the research objectives was performed using SPSS version 17.0.

The population for the study was student course experiences for all students enrolled in one or more online courses between fall 2004 and spring 2009. A purposive sampling of student course experiences for students enrolled in online courses during each of the 16-week semesters between fall 2004 and spring 2009 was used for each of the objectives ($n = 10,802$). Summer semesters were excluded as they are not

comparable in structure or design to a fall or spring course (Nelson, 2006). Online courses as defined by Allen and Seaman (2008) were those courses “in which at least 80 percent of the course content is delivered online” (p. 4). For the purpose of this research, online courses were defined as those courses designated in the Tarleton State University Banner Student Records System with an ONLINE building code.

For objective one, descriptive statistics and frequencies were generated in SPSS version 17.0 using the ANALYZE – DESCRIPTIVE and ANALYZE – FREQUENCIES procedures. The total number of student online course records included in the sample was 10,802 and included duplicate student records. Distinct student records were used for objective one and represented the 4,849 students enrolled in one or more online courses between fall 2004 and fall 2009. There were 1,723 male (36%) and 3,126 female (64%) students in the sample. A majority (85%) of the students were white. Student ID information was encoded during the SQL extract to retain the ability to differentiate students without compromising student anonymity. Cumulative GPA, course load, and prior online course count were excluded from the descriptive analysis to avoid duplicative headcounts. Additional analysis was performed using PL/SQL Developer against the sample data. Data were grouped by semester and year to generate a table of headcounts over time for different demographic variables.

For objective two, a preliminary multiple regression was performed to calculate Mahalanobis’ distance and to examine multicollinearity among the predictor variables (Mertler & Vannatta, 2002). Mahalanobis’ distance was used to identify outliers. Tolerance statistics for the predictor variables in the preliminary regression were used to

identify multicollinearity. A tolerance value greater than .1 indicated if multicollinearity was a problem (Mertler & Vannatta, 2002). The total dataset ($N = 10,802$) was included in this analysis. Gender was coded as 0 = male and 1 = female. Ethnicity was collapsed into 1 = minority and 0 = non-minority. Minority included several ethnicity classifications: African-American, Asian/Pacific Islander, American-Indian/Alaskan Native, Hispanic, foreign/alien, and not reported. Non-minority included the ethnicity classification of white/non-Hispanic. Student classification was coded as follows: 1 = freshman, 2 = sophomore, 3 = junior, 4 = senior, 5 = post-baccalaureate, 6 = masters, and 7 = doctoral. Cumulative GPA, course load, age and prior online course count were included in this analysis.

For objective three, binary logistic regression was conducted to determine if the dependent variable successful completion could be determined using the independent variables gender, age, ethnicity, prior experience with online courses, student classification, GPA, and course load. Prior to analysis, the variable final course grade was recoded as dichotomous (successful completion). Successful completion was assigned a value of 1 if the final course grade was A, B, or C. Successful completion was assigned a value of 0 if the final course grade was any value other than A, B, or C. Gender was coded as 0 = female and 1 = male. Ethnicity was collapsed into 1=minority and 0=non-minority. Minority included the following ethnicity classifications: African-American, Asian/Pacific Islander, American-Indian/Alaskan Native, Hispanic, foreign/alien, and not reported. Non-minority included the ethnicity classification of white/non-Hispanic. Student classification was coded as follows: 1 = freshman, 2 =

sophomore, 3 = junior, 4 = senior, 5 = post-baccalaureate, 6 = masters, and 7 = doctoral. Age, prior online courses completed, course load, and cumulative GPA were all used without modification or recoding.

Cases identified in objective two as outliers were removed from the dataset. No predictor variables were found to violate the test for multicollinearity from objective two so all seven predictor variables were included in the analysis. Binary Logistic Regression was conducted in SPSS version 17.0 using the Forward: LR method.

Results

Objective one was to describe the demographic characteristics of students enrolled in online courses at Tarleton State University. A total of 4,849 distinct students were included in the sample data of 10,802 cases. Approximately two-thirds of the students (64%) were female and approximately one-third (36%) were male. Of the 6,935 female student cases 84% were successful completers. For male students ($n = 3867$), 82% were successful completers. The minimum age for students in the sample was 19 and the maximum age was 72. The mean age for the sample data was 31.57. A majority of the students (85%) were white while Hispanic and African-American students made up 6% and 5% respectively. All other ethnicities had less than 1% (Table 4.1).

Table 4.1

Online Student Ethnicity Comparison (n = 4,849)

Ethnicity	Count	%
White	4,144	85.00
Hispanic	311	6.41
African-American	251	5.18
Foreign/Alien	57	1.18
American Indian/Alaskan Native	45	0.93
Asian/Pacific Islander	28	0.58
Not Reported	13	0.27
Totals	4,849	100.00

Note. Ethnicity is self reported and was not available for all students.

Using the total sample ($n = 10,802$), which included all students enrolled in online courses from fall 2004 through spring 2009, students classified as seniors made up approximately 47% of all records. Masters level students accounted for approximately 35% of the sample data with freshman, post-baccalaureate, and doctoral students each accounting for less than 1% (Table 4.2).

Table 4.2

Online Course Enrollments by Student Classification (n = 10,802)

Classification	Count	%
Senior	5,065	46.9
Masters	3,828	35.4
Junior	1,296	12.0
Sophomore	375	3.5
Freshman	102	0.9
Post-Baccalaureate	91	0.8
Doctoral	45	0.4
Totals	10,802	100.00

Note. Data represented duplicative student counts.

The mean student course load was 10.44 hours. Maximum course load was 24 hours and the minimum load was 0. Additional analysis indicated the students with 0 hours of course work withdrew from the university during the semester. Approximately one-fourth of the students were enrolled in 6 credit hours. The sample data included both undergraduate and graduate students. Table 4.3 illustrates a course load by student level.

Table 4.3

Course Load by Student Level (n = 10,802)

Student Level	Min	Max	Average
Undergraduate	0	24	12.50
Doctoral	3	15	7.69
Masters	0	21	6.73

A majority of students enrolled in online courses between fall 2004 and spring 2009 had an overall GPA of 3.0 or higher on a 4.0 point scale (Table 4.4). On average, more than 90% of students enrolled in online courses had a cumulative GPA of 2.0 or higher.

Table 4.4

Frequencies of GPA by Semester Fall 2004 through Spring 2009

GPA Range	FA 2004	SP 2005	FA 2005	SP 2006	FA 2006	SP 2007	FA 2007	SP 2008	FA 2008	SP 2009
< 0.5	4	5	14	3	10	7	9	8	7	9
0.5 – 0.99	1	2	0	1	0	0	0	0	1	2
1.0 – 1.49	3	1	2	0	1	3	4	2	3	2
1.5 – 1.99	3	9	9	6	6	10	19	12	21	32
2.0 – 2.49	58	65	76	93	95	106	106	120	155	185
2.5 – 2.99	126	119	94	158	151	211	171	219	258	342
3.0 – 3.49	162	142	141	165	167	198	230	245	277	329
3.5 +	237	191	227	204	233	254	291	270	366	380
Unknown	1	3	4	0	2	1	4	1	6	1
Total	595	537	567	630	665	790	834	877	1,094	1,282

Note. Students appear in multiple semesters.

Objective two was to determine if a relationship existed between demographic characteristics of students enrolled in online courses at Tarleton State University. The entire sample ($n = 10,802$) was used for this analysis. A preliminary regression was conducted on all predictor variables to calculate Mahalanobis' Distance and to evaluate multicollinearity among the variables. Tolerance statistics for all seven predictor variables were greater than .1 indicating multicollinearity was not violated (Table 4.5).

Cases that exceeded the chi square criteria of $\chi^2(7) = 14.07$ at $p = .05$ were eliminated from the analysis. Elimination of outliers resulted in 10,098 remaining cases.

Table 4.5

Summary of Linear Regression Analysis for Variables Predicting Successful Online Course Completion (n = 10,802)

Variable	Unstandardized Coefficients		Standardized Coefficients	<i>t</i>	Sig.	Collinearity Statistics	
	<i>B</i>	<i>SE B</i>	β			Tolerance	VIF
(Constant)	8757.40	229.83		38.10	.000		
Age	-69.72	3.52	-0.21	-19.08	.000	0.80	1.25
Gender	290.78	60.89	0.05	4.78	.000	0.98	1.02
Ethnicity	739.58	82.15	0.08	9.00	.000	0.96	1.02
Classification	-102.26	29.63	-0.04	-3.45	.001	0.61	1.65
Prior OL Count	240.90	12.09	0.19	19.93	.000	0.93	1.07
Cumulative GPA	-224.67	48.23	-0.05	-4.66	.000	0.79	1.27
Term Hours	-57.18	7.68	-0.08	-7.45	.000	0.67	1.49

Note. Tolerance statistics > 0.1 indicate multicollinearity was not a problem.

Objective three was to develop a predictive model of academic success for students enrolled in online courses at Tarleton State University. Of the seven predictor variables, four were entered into the model produced by the Binary Logistic Regression: age, cumulative GPA, student classification, and term course load. Model fit statistics were large indicating a poor fitting model, -2 Log Likelihood = 7,402.83. The

classification table is displayed in Table 4.6 and indicated the model correctly classified 85.5% of subjects.

Table 4.6

Classification Table for Binary Logistic Regression Model ($n = 10,098$)

		Predicted		Percentage Correct
		Successful Completion		
Observed		0	1	
Successful Completion	0	145	1,371	9.6
	1	90	8,464	98.9
Overall Percentage				85.5

Note. The cut value is .50.

The summary of model variables is displayed in Table 4.7. Odds ratios for age ($e^B = 0.990$), student classification ($e^B = 0.885$), and term course load ($e^B = 1.061$) revealed little increase in successful completion when the predictor variables increased by 1. The odds ratio for cumulative GPA ($e^B = 7.064$) indicated a larger increase in successful completion when the variable increased by 1.

Table 4.7

Regression Coefficients for Binary Logistic Regression Model (n = 10,098)

Variable	<i>B</i>	<i>SE</i>	<i>Wald</i>	<i>Df</i>	<i>Sig.</i>	<i>Exp(B)</i>
Age	-0.01	0.01	5.27	1	0.02	0.99
Student Classification	-0.12	0.04	12.46	1	0.00	0.89
Term Course Load	0.06	0.01	53.97	1	0.00	1.06
Cumulative GPA	1.96	0.07	827.08	1	0.00	7.06
Constant	-3.94	0.26	237.01	1	0.00	0.02

Conclusions

The purpose of the study was to develop a predictive model of academic success for students enrolled in online courses. A total of seven predictor variables were examined in a sample of 10,802 cases. Each case contained age, ethnicity, gender, student classification, number of prior online courses, cumulative GPA, term hours, and a successful completion indicator. There were a total of 4,849 distinct students in the sample data representing 10,802 course experiences. Of the students in the sample, 64% were female and 36% were male. Comparing online enrollment to the overall university enrollment by gender indicates females take more online courses than males. The overall gender breakdown at Tarleton State University for fall 2004 through fall 2008 was 56.7% female and 43.3% males (Tarleton State University Texan Facts, n.d.).

Forward logistic regression was conducted to determine which independent variables were predictors of student academic success. Data screening conducted for

objective two removed outliers and evaluated the variables for multicollinearity. Model results indicated the overall model fit of the four predictor variables (age, overall GPA, student classification, and term course load) was poor ($-2 \text{ Log Linearity} = 7,402.83$), but the model was statistically reliable in predicting the probability of successful course completion. The model correctly classified 85.5% of the cases. The odds ratio of overall GPA was the highest ($e^B = 7.064$), which supports previous research that indicated GPA could be used as a significant predictor of online student success (Artino, 2007; Gerlich et al, 2009). The constant only model (which assigns all cases to the single category of the outcome variable with the highest count) successfully predicted 84.9% of cases. The final model did improve over the constant only model but only slightly.

The predictor variables gender, ethnicity, and prior online course count were excluded from the model. During the logistic regression analysis, these variables were not shown to improve the model and were excluded. Gender was indicated in the research as a variable linked to student performance in online courses (Deberard et al., 2004; Lawlor, 2007; Lu, 2003; Nelson, 2006; Neuhauser, 2002; Porta-Merida, 2009; Welsh, 2007). Gender was not found to improve the model and supported the findings of Paden (2006) and Welsh that gender was not a useful predictor of students' successful completion of online courses.

Ethnicity was indicated in the research as a possible variable linked to students' academic success in online courses (Lu, 2003; Nelson, 2006; Porta-Merida, 2009; Welsh, 2007). However, ethnicity was excluded from the logistic regression since it did

not provide any improvement in the overall model. This finding supports research by Welsh that ethnicity is not a useful predictor of students' successful completion of an online course.

Much of the research (Holcomb et al., 2004; Lawlor, 2007; Neuhauser, 2002; Porta-Merida, 2009; Welsh, 2007) indicated prior experience in online courses as a determinant in successful completion of online courses. As students take more online courses, they gain confidence and become more comfortable with the technology teaching mode. According to Neuhauser, "a variable that might affect whether a student selected an online course or an FTF course, as well as success in an online course, would be prior experience with technology-enhanced or online courses" (p. 104). Prior experience was not included in the logistic regression model since it did not offer a significant improvement. This finding supports Lu (2003) who indicated the number of distance courses completed did not have a significant impact on performance in online courses.

Recommendations

The Texas Higher Education Coordinating Board (THECB) proposed a change in formula funding for Texas public universities. The current formula uses attempted semester credit hours to calculate the Instruction and Operations portion of the overall formula funding amount. The proposed change would use completed semester credit hours instead of attempted semester credit hours. This change is intended to "encourage better outcomes from our universities" (THECB, 2008, p. 2). The potential financial effects of this change could result in decreased funding. Research indicated course

completion was lower in online courses when compared to traditional course completion (Nelson, 2006). Enrollment in online courses grew faster than the overall university enrollment from fall 2004 through spring 2009. With continued growth in online courses, the university should develop strategies to retain students throughout the semester and focus on online courses to decrease the potential loss of funding resulting from the proposed change in formula funding.

This study was conducted using archival data across multiple semesters. The study was limited to only the data available in the Banner Student Records system. Student perceptions of online courses, faculty experience with online teaching, and other factors that could influence student academic success were not collected or examined. Further research should be conducted to combine the archival data with survey data to build a more complete predictive model.

Binary logistic regression was used because it is useful for predicting the probability a case will fall into one of two categories. Binary logistic regression is not capable of predicting a score that would allow researchers to classify completion by different levels of performance. A more complete model using additional variables about course and faculty characteristics as well as student perceptions, would be an avenue for future research.

Additionally, it would be interesting to track an online cohort from beginning to end to build a trend analysis to identify which students consistently perform well in the online setting. This type of analysis would benefit academic advisors and university

administrators tasked with developing the distance education strategy at Tarleton State University.

Future research related to this study will more closely examine student academic performance in particular course disciplines to identify areas where the university can more effectively expand online course offerings.

The growth of online course delivery at Tarleton State University shows no sign of slowing down. Online course offerings have increased from 53 courses in the fall 2004 to 119 courses in the 2009 spring semester representing an increase of 125%. It is crucial the university plans the growth strategically to maximize the benefits to both the student and the university.

CHAPTER V

SUMMARY AND CONCLUSIONS

The results of this study showed that online course delivery is continuing to experience growth as a method of instructional delivery at Tarleton State University, Stephenville, Texas. Online education is not a new development (Feenburg, 1993; Harasim, 2000), but many researchers agree the future of higher education is linked to online course delivery (Berger & Lyon, 2005; Harasim, 2000; Palloff & Pratt, 2003). Online enrollment has experienced steady growth and according to Allen and Seaman (2007), more than 3.9 million students were enrolled in at least one online course in the fall of 2007.

This study was guided by three primary objectives. The first was to identify the origins of online education at Tarleton State University and included a brief discussion on the general origins of online education. The second was to compare student academic performance and course completion rates between students enrolled in online and traditional courses at Tarleton State University. The final objective was to develop a predictive model of student success for students at Tarleton State University enrolled in online courses. The overarching goal of this research was to assess the economic impact of retention and performance of online course offerings at Tarleton State University.

Formula Funding

Texas public universities receive flexible, discretionary funds from the state based on the formula funding calculation under the direction of the Texas Higher Education Coordinating Board (THECB). Of all the funds appropriated to Texas public

universities, more than 62% comes from formula funding. The primary source of formula funding is generated by the instruction and operations formula which is based on semester credit hours applied to a cost matrix identifying course weights based on level of instruction and discipline. Current funding is based on attempted semester credit hours. For the 2010-2011 biennium, the THECB proposed changing the formula from attempted to completed semester credit hours. This change will potentially impact university funding and increases the importance of course completion to administrators.

History of Online Education at Tarleton State University

According to Nick Lilly, Tarleton State University's Manager of Classroom and Lab Support in the Center for Instructional Technology and Distributed Education (CITDE), Tarleton began offering online courses in the fall of 1996. At that time, no courses were officially listed in the university catalog as "online." The first official course designated as "online" was not offered until 1998 (personal communication, January 16, 2010).

The adoption of online course delivery at Tarleton was largely the result of a push from the faculty. According to George Mollick, former director of the CITDE, the first courses offered online resulted from the right people being willing and able to try something new (personal communication, February 17, 2010). The first courses were built using templates designed with assistance from West Texas A&M University. No formal course delivery system was purchased until several years later. The university currently uses the Blackboard course management system to manage and deliver online course content.

In academic year 2009, Tarleton offered more than 340 courses online not including content for hybrid courses which were traditional classroom courses with an online component. Tarleton increased online course offerings from academic year 2005 to academic year 2009 by 139%. During the same time period, traditional course offerings grew only 3%. Overall enrollment at the university increased from 9,033 students in fall 2004 to 9,634 students in the fall of 2008 (Tarleton State University Texan Facts, n.d.).

In a 2008 memo from the Texas Governor's office, state agencies were asked to reduce their general revenue and general revenue-dedicated appropriations by 5% for the 2010-2011 biennium (Governor Rick Perry, personal communication, January 15, 2010). The reduction resulted in \$2,768,951 of planned cuts for Tarleton State University. The reductions were achieved without need to cut or substantially change course offerings. However, Tarleton explored online course delivery as an additional area to generate cost savings. Research indicated that cost savings with online course delivery were generally realized through savings in facilities and overhead with offering traditional face-to-face courses (Matthews, 1999; Richardson & Swam, 2003).

Online courses offer students normally unable or unwilling to attend traditional classroom courses alternatives to continue their education (Matthews, 1999; Rivera & Rice, 2002). In the fall of 2008, there were 290 students at Tarleton State University taking only online courses. According to the Tarleton State University tuition and fee calculator, a typical three-hour online course produced \$625 in tuition in fees. The

students taking only online courses in fall 2008 contributed approximately \$181,247 in tuition and fees to Tarleton State University.

Course Completion and Academic Performance

Some research indicated online course completion rates were lower than traditional courses (Brady, 2001; Carr, 2000; Nelson, 2006; Simpson, 2003). Other research found course completion was independent of mode of instruction (Kyger, 2008). Russell (2001) explored 355 research reports comparing student outcomes between different delivery modes and the majority of the research examined indicated no significant differences in student outcome based on delivery mode.

This study compared course completion and student academic performance between online and traditional courses. The sample for this study consisted of all students course experiences for students enrolled in courses offered as both online and traditional modes taught in the same semester by the same instructor. Only courses offered during full, 16-week semesters were included in the sample course list. Additional analysis was conducted on course completion rates of online courses by course disciplines. For the comparison of student performance, only students who completed the course were included. All students from the sample were included in the analysis of course completion.

Chi-square analysis indicated a significant difference in student performance between online and traditional courses. This finding supported previous research on student performance in online courses (Faux & Black Hughes, 2000; Paden, 2006; Shoenfeld-Tacher, McConnel, & Graham, 2001). An analysis of course completion

between online and traditional courses also indicated significant differences existed. Contrary to Russell's (2001) findings, significant differences existed in student outcomes between online and traditional courses in this study.

To evaluate course completion by course discipline, only disciplines offered consistently between fall 2004 and spring 2009 were included. Of the 41 subject areas with online courses delivered between fall 2004 and spring 2009, 14 subject areas were consistently offered during each of the 16-week semesters. Chi-square analysis indicated significant differences existed by course discipline, as found in finance, accounting and human resources that had much higher than expected non-completion rates and reading, health, and special education that had much lower than expected non-completion rates. This supported previous research that indicated some disciplines might not work well in an online setting (Carnevale, 2003; Nelson, 2006; Noble, 2004; Paden, 2006; Smith, Heindel, & Torres-Ayala, 2008). Observational analysis indicated course completion rates varied by discipline with reading being the highest (98.2%) and finance the lowest (82.2%).

Predictive Model of Online Academic Success

Research to identify student characteristics leading to success in online courses indicated age (Deberard et al., 2004; Lawlor, 2007; Lu, 2003; Nelson, 2006; Neuhauser, 2002; Porta-Merida, 2009; Welsh, 2007), gender (Lawlor; Liu, 2007; Lu; Nelson; Neuhauser; Paden, 2006; Porta-Merida; Welsh), ethnicity (Lu; Nelson; Porta-Merida; Welsh), prior experience with online courses (Holcomb et al., 2004; Lawlor; Neuhauser; Porta-Merida; Welsh), student classification (Pineau, 2007; Porta-Merida; Welsh),

cumulative grade point average (GPA) (Artino, 2007; Gerlich, Mills, & Sollosy, 2009), and course load (Welsh) as possible predictors of student performance in online courses.

A descriptive analysis of all students enrolled in online courses between fall 2004 and spring 2009 indicated females (64%) enrolled in more online courses than did males (36%). The mean age for all students enrolled in online courses was 31.57 years and a majority (55%) were between 22 and 29 years old. A majority of students enrolled in online courses (85%) were non-minorities.

A binary logistic regression model was created to predict the probability that a student would successfully complete an online course. Of the seven predictor variables, only age, cumulative GPA, classification, and term course load were retained in the model. The model correctly identified 85.5% of cases in the sample. However, model fit statistics were large indicating a poorly fitting model (Mertler & Vanetta, 2002). The constant only model correctly identified 84.9% of the cases. Cumulative GPA had the highest odds ratio at 7.064 and provided the largest increase in the probability of successful completion when the variable increased by one. This finding supports previous research that indicated GPA was a significant predictor of success (Artino, 2007).

Research Implications and Recommendations

The results of this study supported previous research indicating course completion and academic performance could be influenced by course delivery mode (Faux & Black-Hughes, 2000; Paden, 2006; Shoenfeld-Tacher, McConnel, & Graham, 2001). The research was conducted on archival course and student data. Student

perceptions of online course delivery were not measured and no faculty variables were included. Additional research incorporating students' socioeconomic status, perceptions of technology, and course specific attributes, and faculty variables should be conducted to build a more robust predictive model of student academic success in online courses.

Research targeting specific course disciplines found to have low course completion rates should be conducted to identify teaching methodologies and delivery strategies useful for increasing student academic success. Prior research indicated some course disciplines were not well-suited for online delivery (Carnevale, 2003; Nelson, 2006; Noble, 2004; Paden, 2006; Smith, Heindel, & Torres-Ayala, 2008). Instructional designers and faculty should examine courses in finance and accounting identified as being low course completion rates to identify strategies to increase course completion in these subject areas.

Practical Implications and Recommendations

The results of this study indicated significant differences existed between course completion and academic performance in online and traditional courses. Suggested changes by the THECB from funding based on attempted to completed semester credit hours has increased the importance of course completion for public universities in Texas. Given the current state budget situation and mandated reductions in higher education, the financial health of universities is increasingly dependent upon course completion rates. As Tarleton State University continues to expand its offerings of online courses and programs, it is important those courses and programs are designed to effectively increase completion rates and academic performance.

University administrators should critically examine online course offerings at the university to ensure adequate resources are available to accommodate growth and maintain faculty and staff support initiatives to leverage the strengths and benefits of online course delivery. The future of education is reliant upon online course delivery (Berger & Lyon, 2005; Harasim, 2000; Palloff & Pratt, 2003). It is imperative that universities manage growth of online programs to successfully meet the needs of students seeking access to higher education.

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